Prepared for
Settling Work Defendants

DRAFT Remedial Design Work Plan
Northern Extraction and Central Extraction Areas, Operable Unit 2, Omega Chemical Corporation Superfund Site
Los Angeles County, California

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LIST OF ACRONYMS/ABBREVIATIONS/COMMON TERMS

2010 FS	August 2010 OU2 Feasibility Study
2010 RI	August 2010 OU2 Remedial Investigation
2011 ROD	OU2 Interim Action Record of Decision, dated September 20, 2011
2016 CD	Consent Decree lodged April 20, 2016 covering Operable Unit 2 at the Omega Chemical Corporation Superfund Site
AOP	Advanced oxidation process
bgs	Below ground surface
CDM Smith	CDM Smith, Inc.
CDWR	California Department of Water Resources
CE Area	Central extraction area (The location of the CE area is depicted in the 2016 CD, Appendix C as the area between the NE and Telegraph Road.)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	Chemicals of Concern
COPCs	Chemicals of Potential Concern
DQOs	Data Quality Objectives
Day	Day means a calendar day unless expressly stated to be a working day. A working day is a day other than a Saturday, Sunday or federal or state holiday.
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FSP	Field Sampling Plan
Geosyntec	Geosyntec Consultants
gpm	Gallons per minute
H+A	Hargis + Associates, Inc.
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
ICIAP	Institutional Controls Implementation and Assurance Plan

LIST OF ACRONYMS/ABBREVIATIONS/COMMON TERMS (continued)

ICs	Institutional Controls. (ICs are non-engineering controls that will supplement engineering controls to prevent or limit potential exposure to hazardous substances, pollutants, or contaminants at the Site related to the Work and to ensure that the portion of the ROD applicable to the Work is effective.)
IDW	Investigation-derived wastes
IX	Ion exchange
Key Treatment Constituents	Treatment constituents that may require treatment to meet discharge requirements associated with end-use (reinjection, spreading basin, reclaim). The Key Treatment Constituents are considered during the RD based on end use.
LE Area	Leading Edge Area of OU2 is the area in the 2016 CD, Appendix C that is south of the CE Area
Main COCs	13 COCs identified in the ROD as "main COCs" and listed in Table X. Includes eleven VOCs, 1,4-dioxane, and hexavalent chromium. The Main COCs are included in the COC list for the RD.
MCLs	Maximum Contaminant Levels (EPA and California)
msl	Mean sea level
NE Area	Northern extraction area (The location of the NE area is depicted in Appendix C of the 2016 CD as an area north of the CE)
NE/CE Area	A portion of the area of the groundwater contamination identified by EPA as OU2 in its 2011 ROD. The NE/CE Area is bounded by the OU2 boundary as depicted in the 2016 CD, Appendix C and the area north of Telegraph Road. It includes the NE and CE areas as depicted in the ROD as well as the northern portion of the LE area as depicted in the ROD.
NF	Nanofiltration
NL	Notification Level, California State Water Resources Control Board
O&M	Operations and Maintenance
OFRP	Oil Field Reclamation Project

LIST OF ACRONYMS/ABBREVIATIONS/COMMON TERMS (continued)

Omega Property	The property formally owned by the Omega Chemical Corporation, encompassing approximately one acre, located at 12504 and 12512 East Whittier Blvd, Whittier, California. OU1 and OU3 are addressing soil, groundwater, and soil vapor source control at the Omega Property.
OU	Operable Unit, a discrete action that comprises an incremental step in the remediation of a contaminated site.
OU2	Operable Unit 2, the contamination in groundwater generally downgradient of Omega Property, much of which has commingled with chemicals released at other locations into a regional plume containing multiple contaminants which, when considered in total, is more than four miles long and one mile wide. The OU2 boundary is depicted in the 2016 CD, Appendix C.
PC	Project Coordinator, an individual who represents the SWDs and is responsible for overall coordination of the Work.
PDI	Pre-Design Investigation
PDIWP	Pre-Design Investigation Work Plan
Performance Standards	The cleanup levels and other measures of achievement of the remedial action objectives, as set forth in the SOW, Paragraph 1.3(c).
PRPs	Potentially Responsible Parties
QA	Quality assurance
QAPP	Quality Assurance Project Plan
RA	Remedial Action (Remedial Action shall mean all activities Settling Defendants are required to perform under the 2016 CD to implement the 2011 ROD, in accordance with the SOW, the final approved RD submission, the approved RA Work Plan and other plans approved by EPA, including the ICIAP, until the Performance Standards are met, and excluding performance of the RD, O&M, and the activities required under the Retention of Records section of the 2016 CD.)
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan

LIST OF ACRONYMS/ABBREVIATIONS/COMMON TERMS (continued)

RD	Remedial Design (Remedial Design means those activities to be undertaken by Settling Work Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan.)
RDWA	Remedial Design Work Area. (The RDWA consists of the NE/CE Area and includes potential treated water end use locations that may be adjacent to or outside of OU2.)
RDWP	Remedial Design Work Plan
RO	Reverse osmosis
RWQCB-LA	Regional Water Quality Control Board, Los Angeles Region
Site	Omega Chemical Corporation Superfund Site, originally listed on the National Priorities List on January 19, 1999, which is located in Los Angeles County, California, and includes the contamination being addressed by multiple Operable Units.
SOPs	Standard Operating Procedures
SOW	Statement of Work, Appendix B to the 2016 CD.
Supervising Contractor	The entity selected by SWDs to oversee field work.
SVOCs	Semivolatile organic compounds
SWDs	Settling Work Defendants, as identified in Appendix E to the 2016 CD. SWDs include the McKesson Corporation and OPOG (Omega Chemical Corporation Superfund Site Potentially Responsible Party Organized Group).
TDS	Total dissolved solids
USGS	United States Geological Survey
VOCs	Volatile organic compounds
WAMP	Work Area Monitoring Plan
Waste Material	Shall mean (1) any “hazardous substance” under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33); (3) any “solid waste” under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); or as any of the foregoing terms are defined under any appropriate or applicable provisions of California law.
WDR	Waste Discharge Requirements

LIST OF ACRONYMS/ABBREVIATIONS/COMMON TERMS (continued)

Work	All activities and obligations the SWDs are required to perform under the 2016 CD, except the activities required under the Retention of Records section of the 2016 CD.
Work Area	The portions of OU2 that are the subject of Work under the 2016 CD and the SOW.
WRD	Water Replenishment District of Southern California

LIST OF ADDITIONAL ACRONYMS AND ABBREVIATIONS

1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,1,2-TCA	1,1,2-Trichloroethane
1,2-DCA	1,2-Dichloroethane
1,2,3-TCP	1,2,3-Trichloropropane
Bio-LGAC	Biological liquid-phase granular activated carbon
CDPH	California Department of Public Health
cis-1,2-DCE	cis-1,2-Dichloroethane
CMP	Compliance Monitoring Plan
CQAP	Construction Quality Assurance Plan
CQCP	Construction Quality Control Plan
DDW	California State Water Resources Control Board Division of Drinking Water
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	Emergency Response Plan
GSWC	Golden State Water Company
ICIAP	Institutional Control Implementation and Assurance Plan
µg/L	Micrograms per liter
mg/L	Milligrams per liter
msl	Mean sea level
NDMA	N-Nitrosodimethylamine
NLs	Notification Levels
NPDES	National Pollutant Discharge Elimination System
O_3	ozone

LIST OF ADDITIONAL ACRONYMS AND ABBREVIATIONS (continued)

P&ID	Piping and instrumentation diagram
pCi/L	Picocuries per Liter
PHG	Public Health Goal
RO	Reverse osmosis
UV	Ultraviolet

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1. OBJECTIVES AND GOALS OF THE REMEDIAL DESIGN WORK PLAN

CDM Smith Inc. (CDM Smith) has prepared this Remedial Design (RD) Work Plan (RDWP) on behalf of Settling Work Defendants (SWDs). The RDWP was prepared under the Consent Decree (2016 CD); United States Environmental Protection Agency [EPA] 2016a) between the United States, the California Department of Toxic Substance Control (DTSC), Omega Chemical Superfund Site (Site) Potentially Responsible Party (PRP) Organized Group (OPOG) and McKesson Corporation. Appendix B of the 2016 CD is the Omega Chemical Superfund Site RD/Remedial Action (RA) Statement of Work (SOW) for Operable Unit 2 (OU2), and describes all the deliverables to be developed by OPOG and McKesson Corporation (jointly referred to as the SWDs), including this RDWP.

This RDWP includes all the content required in Section 3.1 of the SOW, including the approach and management strategy for the remedial design of extraction and treatment systems and conveyance piping for OU2 groundwater within the Northern Extraction/Central Extraction (NE/CE) Area. The RDWP also addresses the differing treatment requirements of the potential end uses of the treated groundwater outlined in the Record of Decision (ROD). The location of the site and the OU2 boundary are shown in Figure 1.

1.1 Description of the Remedial Action in the NE/CE Area

The scope of the NE/CE Area RA is outlined in the SOW. It includes the design, construction, and operation of one or more groundwater extraction and treatment systems to satisfy and maintain the NE/CE Area Performance Standards (defined in subparagraph 1.3c of the SOW and reiterated in Section 1.2 below). The NE/CE Area covered by the SOW is a portion of OU2 presented in the 2011 ROD. It is bounded by the OU2 boundary depicted in Attachment C of the 2016 CD. It includes the NE Area, the CE Area, and the northern portion (in the vicinity of Telegraph Road) of the Leading Edge (LE) Area as depicted in the ROD. These three areas are jointly referred to as the NE/CE Area in the SOW. Figure 2 shows the OU2 boundary, the NE/CE Area, and the general area of the Remedial Design Work Area (RDWA). The RDWA includes the NE/CE Area as well as areas outside the NE/CE Area to the extent that such additional locations may be utilized to implement the treated groundwater end use.

The main components of the NE/CE Area Work are extraction wellfields in the NE Area (in the vicinity of Sorensen Avenue) and the CE Area (in the vicinity of Telegraph Road); one or more treatment systems that will be determined by selected water end use; an end use of treated groundwater including one or more of the following: reinjection (shallow and/or deep), basin recharge, and reclamation; associated conveyance pipelines; and Institutional Controls (ICs).

1.2 Performance Standards

The Performance Standards identified in the SOW for the RA are as follows:

1. The RA shall provide sufficient hydraulic control laterally and vertically in the NE/CE Area to prevent spreading of the plume and the movement of groundwater contaminated with Chemicals of Concern (COCs) exceeding EPA or State Maximum Contaminant Levels (MCLs), or Notification Levels (NLs) established by the California State Water Resources Control Board Division of Drinking Water (DDW), into less contaminated zones at OU2.

2. Extracted water will meet permit requirements if permits are obtained and any Applicable or Relevant and Appropriate Requirements or "To Be Considered" criteria that are presented in the 2011 ROD that are appropriate for the selected water end use.

Additional Performance Standards shall also be developed during RD intended to address:

i) The level of hydraulic control to be achieved by the extraction of contaminated groundwater in the NE Area;

ii) Requirements related to air emissions, if any; and

iii) Other requirements specific to the end use of the treated groundwater.

Compliance with the Performance Standards shall be verified by demonstrating lateral and vertical hydraulic control within the target zones of remediation in the NE/CE Area (as described in greater detail in SOW sections 1.3 d and e). The target zones will be within the OU2 boundary as depicted in the 2016 CD, Attachment C and will be more specifically identified during the RD.

Although not a criterion for the Certification of RA Completion under ¶ 4.6 of the SOW, after the remedy has operated for a period of time, expected to last several years, compliance shall be determined by demonstrating continued hydraulic control and a decrease in COC concentrations in compliance wells over the long term, recognizing that data must be interpreted to account for potential sources and uncontrolled sources. The locations of the compliance wells shall be in accordance with ¶ 7.7(g) of the SOW ("Compliance Monitoring Plan").

1.3 Institutional Controls

The ICs are essentially informational ICs to reduce the possibility that production wells in the vicinity of OU2 could become contaminated and to prevent operation of the wells from interfering with the containment goals of the NE/CE Area RA. They include:

(1) Annual notifications to all water rights holders in the Central Basin and other stakeholders as appropriate to explain the goals of the remedy, the status of the remedy's implementation, the nature and extent of OU2 contamination and the most recently available groundwater data, and to discuss any related State or local restrictions and prohibitions on well-drilling and groundwater use without necessary approvals or permits;

(2) Periodic meetings with EPA, State and local agencies with jurisdiction over well drilling and groundwater use within the Central Basin to exchange information on the planned or current operation of production wells within OU2 or its vicinity;

(3) An annual review of available documentation maintained by the State and local entities to determine if water supply wells have been installed or other water rights holder had increased groundwater production or production capacity within OU2 or its vicinity; and,

(4) Provisions, to the extent feasible, for contemporaneous notifications from State and local agencies with jurisdiction over well drilling and groundwater use within the Central Basin.

1.4 RDWP Crosswalk

Table 1 provides a cross walk from the SOW, Section 3.1 to the RDWP to facilitate review of this document.

2. BACKGROUND

2.1 Site Overview

OU2 of the Omega Chemical Superfund Site addresses contamination in groundwater generally downgradient of the Omega Property, much of which has commingled with chemicals released at other locations into a regional plume containing multiple contaminants which, when considered in total, is more than four miles long and one mile wide. The 2011 ROD addresses containment of OU2 groundwater contamination. The OU2 boundary, as defined in the 2011 ROD, is presented in Figure 2. The Work covered by the SOW includes groundwater containment in the NE/CE Area as well as additional investigation in the LE Area. Source control at the former Omega Chemical Corporation facility in Whittier, California has been addressed under OU1 and OU3. Since 2001 OPOG has led the investigation and remediation of the former Omega Property under OU1 and OU3 with EPA oversight. In addition to a 1995 removal action, source area remediation has also included groundwater and soil vapor extraction systems which began operating in 2009. McKesson Corporation has worked with DTSC and has undertaken source control actions at its source property located on Sorensen Avenue. On December 7, 2015, the DTSC approved the McKesson Soil Remedial Action Closure Report and determined that the soil remediation portion of the project was complete. Other source properties contributing to groundwater contamination that has commingled with groundwater contamination from the Omega Property and the McKesson property have been addressed, are currently being addressed, or will be addressed by the DTSC or the Regional Water Quality Control Board, Los Angeles Region (RWQCB-LA) through investigations and source control actions. These activities are important for the future cleanup of the Site but are not part of the current SOW.

2.2 OU2 Regulatory History Summary

The EPA assessment of the extent of groundwater contamination at OU2 consisted of several rounds of investigation beginning in 2002 and included the use of temporary hydropunch locations and a permanent network of groundwater monitoring wells developed over several years. The following is a summary of environmental regulatory and enforcement action for OU2:

- 2010 – EPA completed and published the Remedial Investigation (2010 RI) and Feasibility Study (2010 FS) for OU2 groundwater which included groundwater assessment activities that helped characterize contaminated groundwater within OU2 (CH2M Hill, 2010).
- 2010 – EPA issued the Proposed Plan Fact sheet.
- 2011 – EPA issued an Interim Action ROD for OU2 groundwater (EPA, 2011). The Interim Action consisted of groundwater extraction and treatment with drinking water being the preferred end use of treated groundwater. Injection was considered as a backup end use if EPA determined, based on PRPs efforts to negotiate agreements with drinking water purveyors, that a drinking water end use could not be implemented in a timely manner.
- April, 2016 – EPA signed a CD with SWDs requiring SWDs to implement the majority of the 2011 ROD for OU2, including design, construction, and operation of an interim groundwater treatment system(s) and additional investigations for OU2

groundwater. The 2016 CD is currently awaiting approval by the Federal District Court (EPA, 2016A).

- May 2016 – EPA issued an Explanation of Significant Differences (ESD) to update the 2011 ROD. The primary change to the 2011 ROD included removing the preference for a drinking water end-use and expanding the end-use options to include additional end use options:
    - Delivery to an existing reclaimed water system (for irrigation and/or industrial use);
    - Return to groundwater basin using shallow or deep reinjection wells;
    - Return to groundwater basin using an existing spreading basin; or,
    - A combination of end uses.

2.3 2010 RI/FS Summary

The 2010 RI provided the basis for subsequent OU2 regulatory decision-making, and was conducted with the primary goal of characterizing the nature and extent of contamination in groundwater at OU2 to the extent necessary for assessing the risk these contaminants posed to human health and the environment, and for determining whether RA was required (CH2M Hill, 2010). The second goal of the 2010 RI was to obtain information necessary for development of the 2010 FS to evaluate RA alternatives to eliminate, reduce, or control risks to human health and the environment at the Site.

The 2010 RI included the installation of more than 60 groundwater monitoring wells and periodic collection and analysis of groundwater samples from new and existing monitoring wells, and other test data. The 2010 RI incorporated groundwater data collected by different parties as part of investigations of contaminated properties in Whittier, Santa Fe Springs, and Norwalk, overseen by RWQCB-LA and the DTSC. An agency file review was conducted in 2005 to identify facilities that were known or potential sources of contamination in OU2 and field investigations were conducted at five commercial facilities. EPA and its contractors continued to collect information on potential source properties over the next few years. As part of the 2010 RI, a Human Health Risk Assessment (HHRA) was performed to determine if groundwater contamination at OU2 posed a current or potential future risk to human health.

EPA completed the 2010 RI for OU2 by publishing the 2010 RI report (CH2M Hill, 2010). The 2010 RI report included the data and information related to OU2 gathered by different parties, documented the development of a hydrogeologic conceptual model of the Site, presented a numerical groundwater model for OU2 (which was developed as part of the 2010 RI), and provided the results of the HHRA.

In 2010, the EPA published the 2010 FS report concurrently with the Final 2010 RI. The 2010 FS evaluated six possible remedial alternatives including: a no-action alternative; a limited pump-and-treat alternative with extraction at the leading edge only; and four alternatives targeting hydraulic containment of different portions of OU2 groundwater with pump-and-treat systems to prevent the spread of the contaminated groundwater into less contaminated or uncontaminated areas. The four hydraulic containment alternatives differed primarily in the end-use of the water, and included drinking water, reinjection (shallow and/or deep), basin recharge, and reclamation.

2.4 2011 ROD Summary

EPA published the proposed OU2 remedial action plan that described EPA's preferred remedial alternative. After considering public comments on the plan, EPA selected Alternative #6, plume-wide containment with a drinking water end use, allowing flexibility for a reinjection end use (Alternative #4) under certain conditions. EPA's selected remedy was a groundwater pump-and-treat system that included the following components:

- Construction and operation of one or more groundwater extraction wells to pump contaminated groundwater to the surface;
- Construction and operation of water treatment facilities to remove tetrachloroethene (PCE), trichloroethene (TCE), and other contaminants from the groundwater;
- Construction of pipelines and other conveyance systems to transport groundwater to the water treatment facilities;
- Delivery of the treated groundwater to one or more drinking water purveyors or, if EPA determined that the required agreements with drinking water purveyors could not be reached in a timely manner, reinjection of the treated water into the aquifer;
- Administrative or legal controls ("Institutional Controls") to minimize the risk that future pumping from other groundwater wells in the area would interfere with the cleanup; and
- Construction of new groundwater monitoring wells and monitoring of new and existing wells.

2.5 ESD Summary

The ESD (EPA, 2016b) made three changes to the 2011 ROD:

1. The ESD expands the possible uses of the groundwater after it has been pumped to the surface and the contaminants exceeding treatment levels have been removed. There are now four end use options: i) delivery to an existing "reclaimed" water system for irrigation and/or industrial use; ii) return to the groundwater basin using "reinjection" wells; iii) return to the groundwater basin using an existing "spreading basin;" and iv) delivery to one or more water purveyors for use as drinking water. These four end uses are referred to in this update as "reclaimed use," "reinjection," "spreading," and "drinking water use," respectively. The ESD also allows a combination of end uses.
2. The ESD removes a preference established in the ROD for a drinking water use. The 2016 CD does not obligate SWDs to use or perform further analysis of the drinking water end use.
3. The ESD adds a new drinking water standard, the 10 micrograms per liter State of California MCL for hexavalent chromium, as a potential treatment requirement. Hexavalent chromium is one of 13 Main COCs in the groundwater.

2.6 Land Use in and around OU2 and the Remedial Design Work Area

The RDWA is a portion of OU2. It includes the NE/CE Area plus any potential locations outside this area that could be used for water end use management. The majority of the OU2

area was irrigated agricultural land in the early 1900s and agricultural use persisted in this area through the 1950s (CH2M Hill, 2010). Beginning in 1907, oil and gas wells were installed as part of the Santa Fe Springs Oil Field and reached peak production by 1928. Commercial, industrial, and residential development started in the 1920s and 1930s. The historical industrial facilities included chemical manufacturing, processing, and distribution facilities; an oil refinery; oil production facilities, including oil and gas wells, storage facilities, and pipelines; machine shops; plating shops; dry cleaners; manufacturing facilities; gas stations, auto repair, and truck servicing; aircraft parts and engines; laboratories; commercial printing; heat treating; and a wide variety of other businesses. Rail lines and rail loading/ unloading locations are present throughout OU2 along with a large rail yard in the NE/CE Area. The NE/CE Area remains largely commercial and industrial today and continues to be home to a wide variety of businesses including businesses that currently use, or historically used, both chlorinated and non-chlorinated volatile organic compounds (VOCs) and chromium.

Residential use within the NE/CE Area is limited although there is residential use adjacent to the NE/CE Area. Residential areas are present in the southern portion of OU2 (the Leading Edge Area south of Lakeland Road and west of Balsam Street), north of Washington Boulevard near its intersection with Crowndale Avenue, and west of the intersection of Lambert Road and Santa Fe Springs Road. Zones with residential buildings also surround OU2 on the southeast, northwest, and west (Figure 3). A recent area of industrial property converted to residential use is the Golden Springs Redevelopment Project (i.e., Villages at Heritage Springs), located immediately south of Telegraph Road between Bloomfield Avenue and Norwalk Boulevard. This property received redevelopment approval from DTSC after undertaking soil removal actions and appropriate risk assessment for residential use.

The central portion of the Santa Fe Springs Oil Field overlaps OU2 and the RDWA (Figure 4). The California Department of Conservation, Division of Oil and Gas lists a total of 1,378 wells in the Santa Fe Springs Oil Field. Some of these wells are active, but a majority of them were abandoned. It is possible that oil production wells abandoned prior to about 1965 were not completely sealed (i.e., they were likely pressure grouted in the production interval, but not all the way to the ground surface) and their corroded and collapsed steel casings could provide conduits for downward groundwater flow and contaminant migration.

The following sections discuss the large number of known or potential source areas within OU2 and the RDWA. A subset of the known sources that have contributed to the OU2 groundwater contamination are currently under State oversight (DTSC or RWQCB-LA) and are currently being addressed by State led actions. However, a large number of the potential source properties have not yet been adequately evaluated. Adequate evaluation along with source control remedial actions as appropriate are necessary to ensure that the NE/CE Area remedy will be maximally effective. In the 2011 ROD, EPA noted that the State will require source control actions at these facilities as needed and expects that, if and when additional source areas are identified, they will be addressed by the combined efforts of the State and EPA (EPA, 2011). Investigation of known and potential OU2 source areas continues.

2.6.1 Known OU2 Source Properties That Received EPA Special/General Notice Letters

EPA and its contractors have evaluated properties in OU2 to determine whether there are sufficient data to confirm that the properties have contributed, and/or are continuing to

contribute, hazardous substances to OU2 groundwater above health-based levels. EPA's analysis primarily focused on whether or not these properties were known groundwater sources of chlorinated solvents. The following properties have been identified as known source properties and as a result, one or more owners or operators (or arrangers in the case of the Omega Chemical Corporation facility) received a special or general notice letter from EPA. These properties were discussed in the 2010 RI report and are shown on Figure 5.

- Omega Chemical Corporation – 12504 and 12512 East Whittier Blvd, Whittier, CA 90602
- McKesson Corporation – 9005 Sorensen Avenue, Santa Fe Springs, CA 90670
- Angeles Chemical Company – 8915 Sorensen Avenue, Santa Fe Springs, CA 90670
- Pilot Chemical Company – 11756 Burke Street, Santa Fe Springs, CA 90670
- Bodycote Thermal Processing, Inc. – 11845 Burke Street, Santa Fe Springs, CA 90670
- Earl Mfg., Co., Inc. – 11862 Burke Street, Santa Fe Springs, CA 90670
- Mission Linen Supply – 11920 E. Washington Blvd, Whittier, CA 90606
- Chrysler (Site A) Property – 12128 Burke Street, Santa Fe Springs, CA 90670
- Foss Plating Company, Inc. – 8140 Secura Way, Santa Fe Springs, CA 90670
- PhibroTech, Inc. – 8851 Dice Road, Santa Fe Springs, CA 90670
- Continental Heat Treating, Inc. – 10643 Norwalk Blvd, Santa Fe Springs, CA 90670
- Exxon Mobil Oil Corporation – 10628 Fulton Wells & 10629 Norwalk Blvd., Santa Fe Springs, CA 90670

2.6.2 Additional Known or Potential OU2 Source Properties Discussed in the 2010 RI Report

In addition to source properties that received EPA OU2 notice letters, the 2010 RI discussed available information on other potential or known source properties within or immediately adjacent to OU2. The identification of these sources was based on a review of state and local agency files available as of 2010 as well as additional analysis performed by EPA in that general time period. As of the time of the 2010 RI, these investigations included collection and analysis of groundwater, soil, and soil vapor samples in order to delineate contamination in shallow and deep soils as well as contamination in the shallow aquifer. These sites are also shown on Figure 5 and are listed below. Sites listed with an asterisk (*) are ones where the 2010 RI identified the property as a known source of one or more hazardous substances to groundwater rather than a potential source. Since 2010, additional information has become available on many of these sites.

- Modine Manufacturing Company* – 12252 East Whittier Boulevard, Whittier, CA 90602
- CENCO Refinery* – 12345 Lakeland Road, Santa Fe Springs, CA 90670
- G&M Oil Company* – 12559 Lambert Road, Whittier, CA 90606

- The Santa Fe Springs Oil Field and the Oil Field Reclamation Project (OFRP)* – former oil fields located in Santa Fe Springs, CA 90670. EPA's 2010 RI analysis of this large area dates from the mid to late 1990s. This is a large geographical area and EPA did not separately evaluate a significant sub-area of the property previously owned by the Beaumon Family Trust. The Beaumon Trust property was used as an illegal drum storage and disposal facility for many years. The site has impacted regional groundwater with a range of chemicals including 1,4-dioxane, 1,2-dichloroethane (1,2 DCA), and vinyl chloride and has likely impacted groundwater for hexavalent chromium, Freon 113, and TCE. Although the property was determined acceptable for redevelopment and soils up to 20 feet bgs have been removed, deeper soils have not been assessed for continuing impact on the regional groundwater. The property continues to be listed as a RWQCB Geotracker site.
- Unocal Corporation* – 9645 South Santa Fe Springs Road, Santa Fe Springs, CA
- Diversy Wyandotte Corp (Site B) – 8921 Dice Road, Santa Fe Springs, CA 90670
- Los Nietos Business Center (Site C) – 9120-9160 Norwalk Boulevard and 11925-11933 Los Nietos Road (aka 9100 Norwalk Blvd.), Santa Fe Springs, CA 90670
- Technichem (Clutch Systems, Site D) – 8421 South Chetle Avenue, Santa Fe Springs, CA 90670
- Fine Line Paint (Site E) – 12200 Los Nietos Road, Santa Fe Springs, CA 90670
- Mid West Fabricating (Site F) – 8623 South Dice Road, Santa Fe Springs, CA 90670
- TCE Source at Whittier Boulevard* – located in the vicinity of Whittier Boulevard and Mar Vista Street, Whittier, CA
- Electronic Chrome (Site G) – 9128 and 9132 Dice Road, Santa Fe Springs, CA 90670
- Peterson/Puritan (Site H) – 9101 Sorensen Avenue, Santa Fe Springs, CA 90670
- Eastman Kodak (Site K)* – 12080 and 12100 Rivera Road, and 8550 Chetle Avenue, Whittier, CA 90606
- Sleek Craft Boars (Chiller Services, Site L) – 9620 Santa Fe Springs Road, Santa Fe Springs, CA 90670
- Ashland Chemical* – 10505 South Painter Avenue, Santa Fe Springs, CA 90670
- Lincoln Distribution Center – 12500 Slauson Avenue, Santa Fe Springs, CA 90670
- Valvoline Oil Company – 9520 John Street, Santa Fe Springs, CA 9067
- Waste Disposal, Inc. (WDI) Superfund Site* – Los Nietos Road at Greenleaf Avenue, Santa Fe Springs, CA

2.6.3 Supplemental OU2 Source Identification Using Available Information

The California State Water Resources Control Board (via GeoTracker) and DTSC (via EnviroStor) maintain databases of contaminated sites. GeoTracker is the California Water Boards' data management system for sites that impact groundwater or have the potential to impact groundwater. GeoTracker contains sites that require groundwater remediation (e.g., leaking underground storage tank sites, spill sites, military cleanup sites) as well as permitted facilities that could impact groundwater (e.g., landfill sites, waste discharge permitted sites, irrigated land sites, operating underground storage tank sites, and oil and gas production sites). EnviroStor provides existing information on permits and corrective action at hazardous waste management facilities, as well as site cleanup projects under DTSC's oversight.

SWDs downloaded site information from Geotracker and EnviroStor in July 2016 and listed these properties in Table 2. The list includes sites within OU2 and within the RDWA but also include sites in the adjacent areas. These adjacent sites are identified either because they could have adversely impacted regional groundwater in OU2 or the RDWA, they could be in the capture zone of NE/CE Area remedy extraction wells, or they could impact the choice of water end use locations. The total number of these sites identified included in Geotracker or EnviroStor is approximately 150. For simplicity, Table 2 does not include sites that have already been discussed above in the 2010 RI even though some of the 2010 RI sites are also on one of these two databases. Figure 5 shows the mapped location of these sites.

In addition to the potential or known source properties included in Geotracker and EnviroStor, SWDs have undertaken significant collection of information to identify other potential source properties. This effort involved review of historical state and local agency records including but not limited to the South Coast Air Quality Management District, the Los Angeles Department of Public Works, the Santa Fe Springs Fire Department, the Los Angeles County Fire Department, the Los Angeles County Engineer, DTSC, and the RWQCB-LA. It also involved review of historical documents and telephone directories to identify the locations of dry cleaners and plating shops, facilities that have frequently been associated with significant chlorinated solvent and chromium use, releases, and groundwater contamination. The list of these facilities is also included in Table 2 and mapped in Figure 5.

One additional potential source of historical releases to groundwater is the sewer system in Santa Fe Springs and Whittier (Figure 6). SWDs obtained information on sewer condition and repairs from the Los Angeles Department of Public Works and from the Sanitation District of Los Angeles County. These communications indicated that over various time periods, the condition of the sanitary sewers in the area were in need of significant repair. In particular, the 1987 Whittier Narrows earthquake was known to dramatically impact thousands of structures in Whittier and there is documentation as to its impacts at several of the facilities discussed above. Given the number of entities that are users of the sanitary sewer system for industrial wastewaters it is likely that the sewer system is a general background source of industrial contaminants.

2.7 General Setting

OU2 extends from Whitter into the cities of Santa Fe Springs and Norwalk.

2.7.1 Topography

The northern boundary of the OU2 area is located along the base of the La Habra piedmont slope descending from the southwestern flank of the Puente Hills, at an elevation of approximately 220 feet above mean sea level (msl) (CH2M Hill, 2010). The piedmont slope descends toward the southwest at a slope of approximately 2.5 percent to an area approximately 2,800 feet southwest of the northern-most point of OU2. In this area, the ground surface flattens into a broad basin or plain, at an elevation of approximately 150 to 155 feet above msl. In the southwestern portion of OU2, the ground surface rises gently to approximately 160 feet above msl at the northwest end of the Santa Fe Springs plain.

2.7.2 Hydrology

The San Gabriel River, Rio Hondo River, spreading basins, and the Sorensen Avenue Drain form the principal surface water features in the general vicinity (Figure 7) (CH2M Hill, 2010). The San Gabriel River lies just west of Interstate 605 and generally flows from northeast to southwest; Rio Hondo is further west of the San Gabriel River. The spreading basins are located along the channel of the San Gabriel River and Rio Hondo, and receive imported and treated water to artificially recharge the basin. The Sorensen Avenue Drain is a small drain that flows across the basin toward the southeast from a point near the intersection of Dice Road and Slauson Avenue. This channel bends toward the south beyond the limits of OU2 to become La Canada Verde Creek, which cuts through a low gap between the Coyote Hills on the east and the Santa Fe Springs plain on the west.

The San Gabriel River channel is unlined in the Montebello Forebay and the river is a losing stream in this area. The river channel is lined south of the Montebello Forebay and the recharge from the lined portion of the river is expected to be limited. The San Gabriel and the Rio Hondo spreading basins are the major groundwater replenishment sources for the Central Basin. Areal recharge including infiltration from precipitation and return flow from irrigation and mountain front recharge occurring along the basin boundaries are the remaining, but much smaller, groundwater recharge components in the Central Basin. Even before the artificial recharge program began, the Montebello Forebay was a major recharge area because of the unconfined conditions and the presence of the San Gabriel River and Rio Hondo.

The San Gabriel River Watershed falls within Los Angeles County. In 1999, the Los Angeles County Board of Supervisors directed the Los Angeles Department of Public Works (in cooperation with the County Departments of Parks and Recreation and Regional Planning) to prepare a San Gabriel River Master Plan. A watershed management plan for the Coyote Creek sub-watershed is in development by the RWQCB-LA. Several small creeks drain the southwestern slopes of the Puente Hills including the Turnbull Canyon and Wosham Creeks northeast of the former Omega facility (Figure 7). Runoff from the Puente Hills is an expected source of increased mountain front recharge along the northeastern margin of the basin in the Whittier area.

2.7.3 Natural Resources

Natural resources are broadly defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other resources.

Active and inactive drinking water production wells exist within OU2. The groundwater basin is an important source of drinking water for the metropolitan area east of Los Angeles, including the cities of Whittier, Santa Fe Springs and Norwalk. The use of groundwater in the basin is subject to adjudicated water rights administered by the California Department of Water Resources (CDWR), which serves as the Watermaster for the Central Basin. Groundwater production wells were identified in the 2010 RI report and the U.S. Geological Survey (USGS) report prepared in cooperation with the Water Replenishment District of Southern California (USGS, 2014). Wells within and adjacent to OU2 that have reported groundwater extractions over the past five years have been compiled and are shown on Figure 8.

Impacts on natural resources in OU2 were evaluated in the scoping assessment for the ecological risk assessment in the 2010 RI (CH2M Hill, 2010). In summary, the scoping assessment for the ecological risk assessment made the following primary determinations:

- Surface Water - The closest water body to the Site is the San Gabriel River. It runs parallel to the Site about 1 mile northwest of the northwestern OU2 boundary. The groundwater table is below surface water; therefore, there is no potential for contact with contaminated groundwater via surface water pathway.
- Wildlife - Ornamental trees and small areas of landscaped grass represent extremely limited habitat and a very limited diversity of ecological receptors throughout OU2. One small urban park within OU2 and two urban parks adjacent to the OU2 boundary offer recreation areas for residents but provide little habitat for wildlife.

The scoping assessment for ecological risk concluded that there are no complete exposure pathways between contaminants and receptors and no potential for risk to ecological receptors at the Site; therefore, the RA is limited to groundwater.

2.7.4 Cultural

No areas of archaeological or historical importance have been identified at the Site (CH2M Hill, 2010).

2.8 Hydrogeology

There are at least three different interpretations relating to hydrostratigraphic units in the vicinity of OU2 as follows: the CDWR Bulletin 104 (1961); the 2010 RI Report (2010); and the USGS (2014 and on-going). Bulletin 104 focuses on identifying aquifers within the Los Angeles Basin. The 2010 RI Report builds upon Bulletin 104 and focuses on stratigraphic units that consist of a combination of coarse- and fine-grained sequences within and in the vicinity of OU2. The USGS focus is on chronostratigraphic units in the Central Basin which includes age correlated units that are not necessarily tied to aquifer/aquitard sequences. All three of the interpretations incorporate some of the key geologic structural features in the vicinity of OU2, but have conflicts in overall interpretation. A generalized description of the hydrostratigraphy based on Bulletin 104 nomenclature as adopted from the 2010 RI Report is

presented in this Section. A comparison of existing water quality data using the Bulletin 104 and the 2010 RI Report is presented in the data gaps analysis which is an appendix to the PDIWP (Hargis + Associates, Inc. [H+A], In press).

OU2 is located in the Whittier area of the Central Basin, a sub-basin of the coastal plain of Los Angeles County (CH2M Hill, 2010). The coastal plain is bounded on the west and south by the Pacific Ocean and by mountains on the north, east, and southeast. The coastal plain is underlain by an extensive groundwater basin in Los Angeles and Orange Counties.

2.8.1 Hydrostratigraphic Units

The following description of hydrostratigraphic units is preliminary and will be refined for the RDWA based on existing and newly acquired data to be collected during the PDI.

Water-bearing sediments identified in the Whittier area extend to an approximate depth of at least 1,000 feet below ground surface (CH2M Hill, 2010). The identified geologic units consist of recent alluvium, the upper Pleistocene Lakewood Formation, and the lower Pleistocene San Pedro Formation. The Pliocene and Miocene marine sediments below the San Pedro Formation generally contain saline water in the Whittier area, are considered nonwater-bearing where exposed in the Puente Hills, and are not addressed in this report. Figure 9 shows a generalized stratigraphic column of fresh water- bearing sediments in the coastal plain of Los Angeles.

The shallowest hydrostratigraphic units (recent alluvium) include the semiperched aquifer, the Gaspur aquifer, and the Bellflower aquiclude (Bellflower aquitard). The Gaspur aquifer is mainly sand and gravel with a small amount of interbedded clay. The Gaspur aquifer is only found within the recent alluvium. However, the CDWR considers the semiperched aquifer and the Bellflower aquiclude to be present in both the recent alluvium and the upper part of the Lakewood Formation. The saturated portion of the Gaspur aquifer is for the most part to the west of OU2, but does extend east into OU2 in the area roughly centered about Slauson Avenue. The Gaspur aquifer may be present in the vicinity of the NE Area, although may not be present along the southeastern portion of this area. The Gaspur aquifer may be present on the western most portion of the CE Area; however, the current water table appears to be beneath the bottom of the Gaspur aquifer in this area.

The Lakewood Formation consists of non-marine deposits including the Artesia and Gage aquifers although the Artesia aquifer may only be present to the south of the RDWA and therefore is not considered relevant to the RDWA. The Gage aquifer may be absent or unsaturated in areas of OU2 north of the CE Area, and is generally present and saturated within OU2 from near the CE Area to the south. The Gage aquifer does not appear to be an important source of drinking water in the Whittier area, based on elevated total dissolved solids (TDS) concentrations measured in groundwater samples collected at OU2.

The San Pedro Formation unconformably underlies the Lakewood Formation. The San Pedro Formation has been subdivided into five named aquifers separated by clay layers. A finegrained layer is also typically present at the top of the sequence; although, in localized areas, the uppermost San Pedro Formation aquifer may be merged with the overlying aquifer, and one or more of the five aquifers may also be merged (CDWR, 1961). The five aquifers defined within the San Pedro Formation include, from top to bottom, the Hollydale, Jefferson, Lynwood, Silverado, and Sunnyside aquifers. The Hollydale aquifer has been identified by the CDWR (1961) throughout most of OU2 with the exception of the northern

most portion and the southeastern tip. As such, the Hollydale aquifer is expected to be saturated and present in the NE and CE areas. The other aquifers within the San Pedro Formation are thought to be present over most or all of OU2; however, the PDI scope of investigation is generally limited to the Hollydale- and Jefferson aquifers with some limited investigation in the Lynwood aquifer in the NE Area based on data gaps analysis (PDIWP, H+A, In press).

2.8.2 Geologic Structures and Faults

The major geologic structures in the area include the northwest-trending La Habra syncline underlying the alluvial basin (in the general vicinity of Slauson Avenue) and the west-northwest trending Santa Fe Springs (also named Coyote) anticline in the general area between Los Nietos Road and Telegraph Road (Figure 10) (CH2M Hill, 2010).

There are no known faults within OU2. The Whittier and Norwalk faults are both westnorthwest- trending, with the Whittier fault being located to the northeast of OU2 in the Puente Hills and the Norwalk fault being located to the south of OU2 (approximately along Interstate 5).

2.8.3 Groundwater Levels

The depth to groundwater at and in the vicinity of the RDWA has fluctuated over time. Water level hydrographs have been prepared for wells monitored by the Los Angeles County Department of Public Works between 1947 and 2016 (Figure 11). The water levels were highest at the start of this monitoring period and declined relatively steadily until the late 1950's, at which point the water levels were at a historical low. Following this time, which is roughly about the time the Central Basin was adjudicated, water levels recovered to some degree. Between 1970 and 2016, the water levels have fluctuated seasonally on the order of 5 to 20 feet. During this same time frame, the overall water level fluctuation has been almost 60 feet, with the high water level for the period of monitoring occurring in the mid-1990s and the low water levels occurring in 1978 and over the past several years.

The direction of groundwater flow has been evaluated by EPA in the 2010 RI and subsequent groundwater monitoring reports. Overall, the general direction of groundwater flow has been south-southwesterly flow in the area north of the CE Area and to the south-southeast in the area south of the CE Area. There have been shifts in the direction of groundwater flow that appear to correlate with changes in groundwater elevations.

Vertical hydraulic gradients have been evaluated as part of the 2010 RI and subsequent groundwater monitoring reports based on water levels measured in cluster monitor wells (monitor wells with screened intervals completed at different depths at the same general location). At cluster wells, water levels measured in deeper screens are generally lower than water levels in shallower screens.

2.8.4 Hydraulic Properties

The results of hydraulic tests indicate substantial variation in horizontal hydraulic conductivity. The results of existing and proposed hydraulic tests to be conducted as part of the PDI will be used to refine the estimates of horizontal hydraulic conductivity in the vicinity of the NE and CE Areas.

Hydraulic testing was conducted by EPA, OPOG and McKesson in different portions of OU2. Hydraulic testing was also conducted at the Phibrotech, OFRP and BODYCOTE sites. Hydraulic testing consisted of either slug and/or extraction tests. The existing hydraulic test data for the 2010 RI and for Bulletin 104 stratigraphic units have been compiled as part of the data gaps assessment (PDIWP, H+A, In press).

2.9 Groundwater Chemistry

Routine groundwater sampling monitor wells has been conducted by various parties in and adjacent to the RDWA. Groundwater monitoring in OU2 has focused on constituents that have been detected at concentrations exceeding their screening levels (MCLs and NLs) and have been grouped in five categories: VOCs, semi-volatile organic compounds (SVOCs), emergent compounds, metals, and general chemistry.

There were multiple VOCs that exceeded screening levels. The sources of the VOCs appear to be related to multiple sites within and adjacent to OU2. The 2010 RI Report identified VOCs that exceeded screening levels and the 2011 ROD identified eleven VOCs that are part of the Main COCs for OU2 (Section 2.9.1).

There was only one SVOC that was reported above the screening level (bis(2Ethylhexyl)phthalate). It is suspected that the detections are due to sampling activities and are not representative of groundwater conditions in OU2 (CH2M Hill, 2010). However, since bis(2-Ethylhexyl)phthalate was detected above its screening level, this analyte was considered a chemical of potential concern (COPC) for OU2 in the 2010 RI Report. The 2011 ROD included bis-(2-Ethylhexyl)phthalate in the lists of treatment standards for treated groundwater end use, but did not include it as a Main COC.

Emergent compounds (1,4-dioxane, 1,2,3-trichloropropane [1,2,3-TCP], N-Nitrosodimethylamine- [NDMA], perchlorate, and hexavalent chromium) were detected at concentrations exceeding their respective screening levels. Therefore, each of these emergent compounds was considered a COPC for OU2 in the 2010 RI Report. The compounds 1,4-dioxane, 1,2,3-TCP, perchlorate, hexavalent chromium and NDMA were suspected to be related to one or more operations within OU2. The 2011 ROD included 1,4-dioxane and hexavalent chromium in the list of Main COCs, but did not list the remaining emergent compounds.

Aluminum, antimony, arsenic, total chromium, manganese, mercury, nickel, selenium, thallium, and vanadium were detected at concentrations exceeding their respective screening levels, and were therefore considered COPCs for OU2 in the 2010 RI Report. Some of detected metals could be naturally occurring but industrial sources located within OU2 may have also contributed to these metals exceedances given that various industrial sources used these compounds (including total chromium and arsenic). The 2011 ROD did not include any of the metals as Main COCs, but did include aluminum, manganese, total chromium and selenium in one or both lists of treatment standards for treated groundwater end use.

General chemistry parameters have also been assessed in OU2 and several general chemistry parameters have been detected in exceedance of screening levels (e.g. TDS, nitrate and sulfate). The majority of general chemistry detections represent background (or natural) conditions in groundwater. The ROD did not include any of the general chemistry constituents as Main COCs, but did include TDS, nitrate and sulfate in the lists of treatment standards for treated groundwater end use.

2.9.1 Constituents

The 2011 ROD identified 13 COCs for OU2, eleven of which are VOCs (PCE, TCE, Freon 11, Freon 113, 1,1-dichloroethene [1,1-DCE], cis-1,2-dichloroethene [cis-1,2-DCE], chloroform, carbon tetrachloride, 1,1-dichloroethane [1,1-DCA], 1,2-DCA, and 1,1,2-trichloroethane [1,1,2-TCA]); one is an inorganic constituent (hexavalent chromium) and the remaining compound is 1,4-dioxane (Table 3). As indicated previously, these 13 COCs will be referred to as Main COCs in the RD documents and are included in the COCs for the purpose of the RD. Containment of the Main COCs should also contain other chemicals, including benzene, toluene and other fuel related compounds, identified in the 2010 RI as chemicals exceeding screening levels.

The 2011 ROD also identified treatment standards for different end uses, which included ten of the 13 Main COCs and an additional eight or nine constituents, depending on end use. For the purposes of the PDI, the additional constituents will be referred to as "Key Treatment Constituents". Based on the end use selected, extracted water will be treated for chemicals and constituents exceeding permit limits.

2.9.2 Distribution

The distribution of Main COCs and Key Treatment Constituents within and in the vicinity of the RDWA was evaluated as part of the data gaps analysis (PDIWP, H+A, In Press). The following provides a summary of the current understanding of the general distribution of Main COCs in the RDWA. The distribution of COCs will be refined during the PDI to define the target zone for the NE and CE extraction wellfields and will be discussed in more detail in the PDI Report.

- Of the Main COC VOCs, PCE and TCE exceeded their respective MCLs over the largest area and greatest depth within the RDWA. Both of these compounds are common solvents used/handled by many sites within the RDWA and OU2. The concentrations of these two compounds are generally greatest in the vicinity of source sites in shallow groundwater and have not been detected exceeding MCLs in monitoring wells deeper than 200 feet within the RDWA. In addition, the concentration of these two compounds generally decreases toward the southern end of the CE Area; although there has been detection of relatively elevated concentrations of these compounds to the south of the RDWA, indicating the presence of source areas in the LE to the south of the CE Area.
- Freon 11 and Freon 113 were detected at lower concentrations and within the overall extent of areas of PCE and TCE detections. Freon 11 and Freon 113 were known to be used by businesses in OU2 and the types of businesses known to operate currently and historically in OU2 were the types of businesses that frequently utilized Freons. Uses included dry cleaning, cold cleaning electrical parts, vapor phase cleaning, photographic film and magnetic tape cleaning, use in refrigerants, use in blowing agents, use in oil field activities, use in fire extinguishing, use in propellants, and use in oil field activities. Freon was also commonly found in both automotive and industrial waste oils. Freon 113 has been infrequently analyzed at sites within OU2 but it was commonly found in soil, soil gas, or groundwater at sites where it was analyzed. Freon 11 was more frequently analyzed and was found in at least one environmental medium at those properties where it was tested for.

- The remaining Main COC VOCs are generally within the overall extent of PCE and TCE.
- 1,4-Dioxane has been detected exceeding the NL over an area and depth similar to PCE and TCE, although at generally lower concentrations. This compound is often associated with the common solvent 1,1,1-trichloroethane, which has been used/handled by many sites within the RDWA. 1,4-Dioxane has not been analyzed in as many groundwater sample locations as VOCs; however, the concentration of 1,4-dioxane is generally greatest in the vicinity of source sites in shallow groundwater and has not been detected exceeding the NL in monitor wells deeper than 200 feet within the RDWA.
- Hexavalent chromium has been detected exceeding the MCL over a relatively wide area of the RDWA, although it does not appear to be as extensive as PCE and TCE or 1,4-dioxane. Hexavalent chromium has not been analyzed in as many groundwater sample locations as VOCs; however, the concentration of hexavalent chromium is generally greatest in the vicinity of source sites in shallow groundwater and has not been detected exceeding the MCL in monitoring wells deeper than 200 feet within the RDWA. It should be noted that neither of the SWDs sites are sources of hexavalent chromium.

3. REMEDIAL DESIGN SCOPE OF WORK

This section of the RDWP describes the RD scope of work, including the major tasks and the project deliverables to be completed and submitted during the RD. A schedule to accomplish this work is presented in Section 5.

3.1 Description of Extraction and Treatment Systems

The remedy for the RDWA includes design and construction of new extraction wells, groundwater treatment facilities, and conveyance pipelines for extracted groundwater and treated effluent. Groundwater treatment involves construction of at least one treatment plant comprised of multiple treatment processes whose final configuration will be determined during the RD. Treated effluent will be routed to a yet to be determined end use. In addition, the RD will evaluate installation of any new monitoring wells and implementation of ICs.

As discussed in Section 1.2 of this RDWP, the 2011 OU2 ROD outlined performance standards for both hydraulic containment of contaminated groundwater and discharge from the treatment plant. In addition, the treatment plant will meet discharge standards as determined by the selected end use of treated groundwater. These performance standards and discharge limits are discussed in greater detail in the following sections of the RDWP.

3.1.1 Containment Via Extraction Wells

The NE/CE Area will include two extraction wellfields, one in the NE Area and the other in the CE Area. Extraction in the CE Area will be in the vicinity of Telegraph Road; extraction in the NE Area will be in the vicinity of Sorensen Ave (Figure 2). Extraction wells in the NE/CE Area will perform in conjunction with one another to meet Performance Standards and to address variability in extraction rates between the two sets of extraction wells that may be necessary to achieve capture in the target zones. The final groundwater extraction locations will be selected during the RD based on the findings of the PDI tasks.

In order to achieve the extraction wellfield objectives to hydraulically contain COCs exceeding MCLs or NLs within the NE/CE Area and to intercept a significant amount of the higher concentration COC mass in the NE Area moving past Slauson Avenue, the current best estimate of the required pumping rate for the NE/CE Area is 1,100 gallons per minute (gpm) (total). The NE Area pumping rate would be no less than 300 gpm, unless EPA approves a lower rate. The design capacity of the extraction and treatment system will be the required pumping rate plus a safety factor. The safety factor may be as low as 20 percent if the PDI work produces a better estimate of the hydraulic conductivity in the RDWA capture zone and refines the areas and depths targeted for hydraulic capture. Depending on the results of the PDI, additional or fewer extraction wells may be required to achieve hydraulic control. These assumptions are expected to be representative of the facilities required as part of the remedy, but may require adjustment during the RD process.

The exact locations, depths, screened intervals and design pumping rates for the extraction wells will be determined during the RD and will depend on the specific well arrangement needed to achieve containment of the plume once practical and constructability issues such as access have been evaluated. The specific conveyance network(s) required for the selected remedy will also be determined during the RD after the extraction wells, treatment plant(s), and treated water delivery locations are finalized, and after other practical and

constructability issues such as access, location and density of existing underground utilities, and traffic are evaluated.

3.1.2 Groundwater Treatment

Pipelines will convey untreated groundwater from the extraction wellfields to the NE/CE Area groundwater treatment system(s). The major treatment processes required will be influenced to some degree by the end use(s) of treated groundwater. Treatment processes identified in the ROD and ESD to be evaluated in the RD are discussed in detail below.

This presentation of treatment technologies should be considered preliminary. The main treatment process technologies and ancillary technologies will be evaluated in detail and combined to form a treatment system that can achieve the effluent Performance Standards, but RD is the process during which a full evaluation is performed. The treatment technologies described below are based mainly on the current understanding of groundwater quality at OU2, as compared to effluent requirements for the end use options being considered. If any additional Key Treatment Constituents are identified during the PDI that are not discussed herein and for which further treatment will be required, additional or different treatment processes may need to be considered during RD to achieve the required effluent Performance Standards in the most reliable and efficient manner. Section 3.6.3 discusses the potential need for bench scale and/or full scale treatability studies.

Advanced Oxidation Processes

Advanced oxidation processes (AOPs) are a potentially effective technology for the removal of 1,4-dioxane and many VOCs. This treatment technology typically employs either ultraviolet (UV) light or ozone (O_3) and a chemical oxidant, such as hydrogen peroxide. The process forms hydroxyl radicals which react with the 1,4-dioxane and VOCs in the groundwater to degrade them. Some alkanes, such as chlorinated ethanes, are not readily destroyed by AOP. The process can also generate certain unwanted by-products, such as iron (Fe) and manganese (Mn) precipitates and partially-degraded organics. Consequently, AOP is often designed in conjunction with bag filters to remove precipitates, an air stripper, liquid-phase granular activated carbon (LGAC), or biological liquid-phase granular activated carbon (Bio-LGAC), to remove these residual organic contaminants.

Liquid-Phase Granular Activated Carbon Adsorption

LGAC adsorption technology is potentially applicable for the removal of a wide range of contaminants including TCE; PCE; 1,1-DCE; 1,2-DCE; carbon tetrachloride; 1,1,1-TCA; and gasoline fuel constituents. Chloroform, Freon 11, and Freon 12, although not as readily amenable to adsorption, can also be effectively removed depending upon the concentrations in contaminated groundwater.

In a typical process, water is pumped through a vessel that contains activated carbon. Over time, the activated carbon becomes saturated with contaminants. The LGAC process creates spent carbon that must be either regenerated offsite for reuse or disposed offsite as a solid waste.

Biological Liquid-Phase Granular Activated Carbon

Bio-LGAC technology employs activated carbon as a substrate media upon which a biological treatment film is established that can effectively degrade organics, including those by-products that may potentially form in an AOP. The treatment process occurs in conventional LGAC carbon vessels. However, instead of periodically replacing the carbon, it is periodically backwashed and scoured to remove the biomass that is formed in the carbon bed. The backwash water is typically sent to a storage tank to allow settling of the biomass, addition of polymers to further enhance liquid-solids separation, and dewatering of the settled biomass sludge in a plate and frame filter press. The filtrate and decanted water from the backwash storage tank is recycled back to the front end of the process.

Bio-LGAC was carried through the 2010 FS process to treat AOP residuals such as alkanes. However, as recommended in the 2010 FS, during the remedial design phase Bio-LGAC will be further evaluated as part of the final treatment train.

Air Stripping

In the air stripping process, treated groundwater is introduced into the top of a vertical vessel, flowing downward and countercurrent to an upward flow of air, thereby transferring the volatile contaminants into the air phase. Air stripping technology is potentially effective for the removal of VOCs and volatile alkanes. To varying degrees, the functionality of air stripping has overlap with both LGAC and Bio-LGAC. It may be advantageous to treat RDWA extracted groundwater using air stripping technology as an alternative to or in conjunction with the other two processes. As recommended in the 2010 FS, air stripping will be further evaluated during RD for potential inclusion in the remedial treatment process.

Ion Exchange

Ion exchange (IX) is potentially applicable for the removal of nitrate; metals, such as selenium; perchlorate; and hexavalent chromium. IX technology reduces contaminant concentrations by using a resin that has an ionically charged surface containing chloride ions which are preferentially removed and replaced by contaminant ions, thereby removing the contaminant from the water and trapping it on the resin.

The results of the PDI will determine rather or not IX treatment is included in the RD. For example, use of a reverse osmosis (RO) system would remove both hexavalent chromium and trivalent chromium making IX a redundant treatment option for hexavalent chromium. However, the use of anionic IX resin for nitrate and/or perchlorate treatment may be required to meet end user requirements and will be evaluated in the RD.

The major components of an IX system are IX vessels, and in many cases a backwash system and/or a brine regeneration system. Backwashing maybe required to periodically remove broken resin beads and accumulated solids. Backwash water can either be disposed of offsite as a wet sludge, or it can be dewatered before offsite disposal. IX systems can be provided with single-use resin in which the resin is replaced periodically when it has lost its contaminant loading capacity. Alternatively, IX systems may utilize regenerable resin which may be regenerated using a sodium chloride brine. Regenerable IX processes require subsequent treatment or management of the waste brine stream that is produced during the IX resin regeneration process, and contains the removed COCs and Key Treatment Constituents. The need for backwash and onsite regeneration will be determined during the RD.

In addition, the IX process causes a modest increase in the TDS of the water and a significant increase in chlorides. This may be critical depending upon which end use option is selected during the RD.

Membrane Processes

Nanofiltration (NF) and RO are membrane filtration processes that are highly effective at removing a wide range of ionic species and significantly reducing TDS. The key element of NF and RO systems is a semipermeable membrane designed to allow certain constituents to pass through, while blocking others. The constituents that pass through include water, usually smaller molecules of dissolved solids, and most dissolved gases. NF and RO differ by the pressures under which each operate and their effective removal capacities. The constituents that do not pass through the membrane are concentrated in brine that would likely require discharge to a sewer system.

Ancillary Groundwater Treatment Technologies

Additional processes may be required in conjunction with the previously described treatment processes to provide a complete treatment system. These are complementary technologies and may include technologies such as those listed below:

- **Multimedia filters:** Used for particulate removal; requires periodic filter media bed backwashing or filter replacement;
- **Catalytic Carbon Adsorbers:** Used for removal of residual peroxide that is often present in process water downstream of an AOP;
- **Disinfection:** Used to disinfect treated water to be used for reinjection end uses; typical disinfection processes include the addition of various disinfecting chemicals such as chlorine, ozone, chlorine dioxide, chloramine, peroxone (ozone/hydrogen peroxide) or treatment with UV irradiation with UV light, or combinations of these;
- **Vapor-phase granular activated carbon:** Used in conjunction with air stripping (if used) to treat off-gas to comply with air quality discharge limits or requirements;
- **Dewatering Systems:** Systems used to treat sludge that may be produced from equipment backwashing operations, biological, IX, or membrane processes and which typically include storage tanks, sludge pumps, plate and frame filter presses, and polymer addition systems; and
- **Chemical Injection Systems:** Systems used for water conditioning or reaction with specific constituents in water as part of an overall treatment system, typically including carboys or tanks to store the chemicals and metering pump systems for injecting the chemicals; typical chemicals include polymers to enhance particulate or solids removal or settling, oxidizing or reducing agents for a specific purpose such as removal of residual chlorine if needed, and acid and base chemicals for pH adjustment.

3.2 Potential End User Discussion

In addition to groundwater extraction and treatment, the NE/CE requires the construction of water conveyance systems to transport treated groundwater from the treatment system(s) to the end use location(s). EPA has prepared an ESD for OU2 (EPA, 2016b), which adds several

end uses of treated groundwater and removes the preference for drinking water end use. Therefore, reinjection (shallow or deep), basin recharge, and reclamation will be the end uses to be evaluated during RD as potential end uses of the treated groundwater unless the SWDs and EPA mutually agree that it is no longer appropriate to evaluate one of the contemplated end uses after considering the cost-effectiveness and implementability of the end use.

Each end use option will be assessed concurrently during RD. Information will be compiled regarding implementability (including access, timing, and logistical constraints), permitting requirements, and cost-effectiveness early in the RD process. Each of the options will be ranked, and the highest ranked option retained for 30% design; this decision will be made in concert with EPA. In the event that two options rank similarly high, consideration will be given to carrying both options through to the 30% design level to ensure that the best end use option is selected.

Additionally, the RD will also assess a hybrid option which couples spreading basins with either reinjection or reclaim as contingencies. The primary constraints to use of the spreading basins are the time periods when they are not available due to either winter storm runoff when the capacity of the basins may be significantly decreased, or during maintenance activities. RD will first evaluate the feasibility of ceasing groundwater extraction during periods when the spreading basins are not available. If the duration of these periods is limited, it may be feasible to cease extraction without impacting the effectiveness of the remedy at achieving the hydraulic control Performance Standard. Conversely, if the basins are expected to be unavailable for longer periods of time then RD will consider routing the extracted and treated groundwater to either shallow injection wells or into the reclaim piping system established by the Central Basin Municipal Water District (CBMWD) for the periods when the spreading basins are unavailable. CBMWD has the most extensive reclaim distribution network of any water entity in the area.

3.3 Effluent Water Quality Discussion

The potentially relevant discharge limits for treatment of water extracted from the RDWA are dependent on the selected end use and will be established during the RD. Discharge limits for the end uses under consideration are presented in Table 4 for all currently known Main COCs and Key Treatment Constituents. These potentially relevant discharge limits will be reassessed during RD as additional constituents may become relevant for design and regulatory limits are subject to change.

The constituents included in Table 4 are those that are potentially relevant for design and permitting for the end uses currently under consideration. The table includes the 13 COCs identified in the ROD, as well as eight key treatment constituents (Bis(2-Ethylhexyl)phthalate, Perchlorate, Total Chromium, Aluminum, Selenium, Nitrogen, Sulfate, TDS) and various others considered relevant for treatment process design (e.g. Boron, Uranium, Ammonia, and TSS).

The potentially relevant discharge limits presented in Table 4 for the shallow aquifer reinjection end use are based on the discharge limits presented in RWQCB-LA Order No. R4-2014-0187, General Waste Discharge Requirements for In-Situ Groundwater Remediation and Groundwater Re-Injection, which refers to Part 3 – Water Quality Objectives – of the RWQCB-LA Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.

Anticipated discharge limits for the deep aquifer reinjection end use are based on the more stringent of USEPA and DDW primary MCLs where applicable and with few exceptions. The anticipated limit for chloride reflects that which is presented in the RWQCB-LA Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. In lieu of an established primary MCL, the secondary MCL for TDS served as the basis for the anticipated limit for this parameter. For both shallow and deep aquifer reinjection end uses, the anticipated discharge limit for 1,4-dioxane reflects the NL for the emerging contaminant.

The basis for the treatment standards for the spreading basins end use is RWQCB-LA Order No. R4-2013-0095, a General NPDES Permit that identifies requirements for discharges of groundwater and project dewatering to surface waters in the coastal watersheds of Los Angeles and Ventura Counties. The anticipated discharge limits presented are specific to discharges to "other waters" (i.e. discharges to waters for non-municipal and non-domestic use). RWQCB-LA Order No. R4-2013-0095 presents discharge limits both in terms of "maximum daily limit" and "average monthly." For the purposes of Table 4, the more restrictive limit for each constituent was used which, where available, was the average monthly discharge limit. Anticipated effluent concentration limits presented for Total Dissolved Solids (TDS), Sulfate, Chloride, Boron and Nitrogen, are reflective of discharge limits specific to the most restrictive reach of the San Gabriel River Watershed in the general vicinity of the RDWA, as per Attachment B of Order No. R4-2013-0095.

The anticipated discharge limits presented in Table 4 pertaining to the reclaimed water end use are based on The Agreement for Purchase and Sale of Reclaimed Water between County Sanitation District No. 2 of Los Angeles County and the Central Basin Municipal Water District ("Agreement"), for those constituents which are included therein. Concentration limits presented for constituents for which limits are not specified in the Agreement, reflect those which are presented in RWQCB-LA Order No. R4-2013-0095. The same assumptions used for selection of anticipated discharge limits for the spreading basin end use were applied to the constituents relevant to the reclaimed end use, as described above.

In recognition of Exhibit A, part A, item number 4 of the Agreement, anticipated reclaimed end use discharge limits presented in Table 4 for hexavalent chromium, and chloroform reflect State MCLs. At the time of this RD WP, no State or Federal MCL has been promulgated for 1,4-dioxane. As such, the anticipated discharge limit for 1,4-dioxane presented Table 4 reflects the California notification level (NL), which is a health-based advisory level for the contaminant in drinking water. In accordance with Exhibit A, part A, item number 4 of the Agreement, any other trace constituent identified during RD will be treated to their respective MCLs, NLs, or other applicable standards.

The discharge limits presented in Table 4 are not final. During RD, all discharge limits for all relevant COCs, Key Treatment Constituents, and other pertinent compounds will be reevaluated, including a review of RWQCB-LA Orders No. R4-2013-0095 and R4-2014-0187 as well as any other applicable current guidelines.

3.4 Treatment Facility Siting Discussion

Current plans, subject to further evaluation during RD, are that a single treatment plant will be constructed. The primary criteria for siting the treatment plant are:

- Accessible property of sufficient size, and available at a reasonable, market driven costs.

- Proximity to the NE and CE extraction wells.
- Proximity to the most cost-effective alignment of pipelines, from the extraction wells to the treatment plant and from the treatment plant to the selected end use.

With regard to the third criterion above, the selected end use will directly impact the location of the treatment plant. For example, if the end use will be shallow reinjection, then proximity to the location of the reinjection wells will be important. Conversely, if the selected end use will be either discharge to the spreading basins along the San Gabriel River or Rio Hondo, or reclaim, then proximity to the existing conveyance pipelines will be an essential component of the siting process.

During RD, identification of alternative treatment plant locations and selection of the ultimate location will follow a multi-step process, as follows:

Step 1 – Preliminary estimation of the space requirements for the treatment plant.

Step 2 - Use of aerial photography, including but not limited to Google Earth, to identify properties that have sufficient available land for the plant.

Step 3 – Ground-truthing, via direct observations of each site identified in Step 2.

Step 4 - Coordination with the appropriate landowner(s) and, to the extent possible, with applicable local municipal agencies (e.g. the City of Santa Fe Springs Department of Public Works).

Step 5 – Using ranking criteria to be developed early in the RD process, rank each potential site.

Step 6 - Begin negotiations with the land owner for the top ranked site. It is possible that discussions with more than one property owner will occur, should multiple site score similarly.

It is important to emphasize that selection of the treatment plant site during RD is expected to be an iterative process, owing to the need to concurrently select the ultimate end use of the water and identify the most cost-effective pipeline alignments.

3.5 Use of Existing Facilities

There are only two existing groundwater-related facilities within or adjacent to OU2. These are (a) water supply wells operated by the Golden State Water Company (GSWC) (adjacent), and (b) a water supply well operated by the City of Santa Fe Springs.

GSWC has operated four water supply wells in the LE Area for many years, including wells designated as Dace 1 and Pioneer 1, 2, and 3. These four wells have total depths ranging from 216 feet to 472 feet. Each of these four wells have exhibited low concentrations of VOCs (e.g. less than MCLs to as much as three times the MCL for individual VOCs) since the mid-1980s. Wellhead treatment has been installed and is operational on one of the Pioneer wells. In 2014, GSWC installed a new Dace 2 well to a total depth of approximately 1,500 feet bgs, with the uppermost screened section at a depth of 650 to 815 feet bgs.

The City of Santa Fe Springs has operated water supply well 30-R3 for more than 20 years. The well is currently on inactive status.

The SWDs do not intend to make any use of these facilities for the implementation of the OU2 remedy.

3.6 Pre-Design Tasks

The required pre-design tasks and deliverables related to the NE/CE Area are described in the SOW. The scopes of pre-design tasks are contained in supporting deliverables that are included with the following document that the SWDs will submit to EPA for approval.

3.6.1 Pre-Design Investigation

The purpose of the RDWA PDI is to address data gaps by conducting additional field investigations. The SWDs will submit the following two documents to EPA for approval:

- PDIWP which includes a data gap assessment; plans for installation of new monitoring wells, measurement of water levels, collection of groundwater samples at new and existing wells, and aquifer testing within the RDWA; FSP; HASP and a QAPP; and
- PDI Evaluation Report, which includes a summary of the investigations performed and results obtained; data validation and laboratory data reports; and conclusions and recommendations relevant to the RD.

The PDIWP, data gaps analysis and associated FSP will be prepared by H+A. The HASP and QAPP will be prepared by Geosyntec Consultants (Geosyntec). The PDI field tasks will be conducted by qualified contractors that will be responsible for implementation in accordance with the PDIWP as approved by EPA. The PDI Evaluation Report will be prepared by a qualified contractor that will be responsible for evaluating existing and PDI data to meet the requirements outlined in the SOW. The contractor responsible for preparing the PDI Evaluation Report may rely on documents prepared by field implementation contractor(s) and/or other qualified contractors.

3.6.2 Groundwater Modeling

The purpose of groundwater modeling is to provide information to support the design of the RA and to aid in evaluating the performance of the remedy. The numeric groundwater model must support determination of minimum extraction rates; flow capacities for extraction wells and treatment system; and well locations for extraction, monitoring, and compliance. The SWDs will submit the following three documents to EPA for approval:

- Groundwater Flow Modeling Work Plan
- Groundwater Flow Model Development and Calibration Report
- Groundwater Flow Model Predictive Simulations Report

The Groundwater Flow Modeling Work Plan will be prepared by Geosyntec. The construction, calibration and predictive simulations will be conducted by a qualified contractor with relevant experience in accordance with the Groundwater Flow Modeling Work Plan as approved by EPA. The documentation and modeling required reports will likely be prepared by the contractor implementing the groundwater flow modeling and predictive simulations; regardless the contractor will implement the work to meet the requirements outlined in the SOW.

3.6.3 Treatability Studies

The need for full scale treatability studies prior to the RD is not anticipated as all treatment options have demonstrated performance in water treatment. If additional Key Treatment Constituents are identified during the PDI for which further treatment will be required through additional or differential treatment processes than those presented in this RDWP, treatability studies may be recommended during the RD phase. However, bench scale studies of the following treatment options are recommended using water samples collected during the PDI investigation activities:

a. AOP technology, with downstream Bio-LGAC treatment if appropriate; and
b. IX technologies, including both anionic and cationic resins, as necessary.

The AOP oxidation processes is by nature non- selective. Therefore, the chemistry of contaminated groundwater can directly affect the results of AOP treatment. This evaluation will likely consist of a vendor-conducted bench scale test of the AOP process. If Bio-LGAC is needed to achieve effluent requirements, water treated by AOP will be used as part of a bench scale study to confirm Bio-LGAC efficacy.

3.7 Remedial Design Tasks and Deliverables

The required RD tasks and deliverables related to the NE/CE Area work are described in the SOW and include the following submittals for EPA approval:

- Preliminary (30%) RD,
- Intermediate (60%) RD,
- Pre-final (95%) RD, and
- Final (100%) RD

The Preliminary and Intermediate Designs will be prepared to meet the requirements of the SOW regardless of method of contracting. Depending on the method of contracting, the Intermediate (design/build) or Pre-Final Designs (design/bid/build) would include the following supporting documents:

- Site Management Plan
- Operation and Maintenance (O&M) Plan,
- Compliance Monitoring Plan (CMP),
- Construction Quality Assurance/Quality Control Plan (CQA/QCP),
- Emergency Response Plan (ERP), and
- An Institutional Controls Implementation and Assurance Plan (ICIAP).

If design/build approach is selected the Pre-Final and Final design deliverables would not be required, rather a revised Intermediate design would be submitted which fully addresses EPA comments on the Preliminary and Intermediate Design submittals in lieu of the requirements for the Pre-Final and Final designs. Record drawings will be produced by the procured RA contractor in lieu of final design drawings.

The design requirements, plans, and reports required for the RD under each procurement scenario are summarized in Table 5 and discussed in more detail in the sections below.

3.7.1 Design/Bid/Build Approach

A design/bid/build approach will include all four phases of work.

Preliminary Design (30%)

As part of the Preliminary Design, major design elements will include items such as the number, size, location, and depth of monitoring and extraction wells; the location of the treatment plant and the treatment technology used; the location of conveyance pipelines from the extraction wells to the treatment plant to the treated water end use (reinjection wells, spreading basin(s), or reclaim pipeline(s)) based on ground-proofing, site visit, readily-available utility information, and/or photo documentation; and implementation of ICs. Substantive permitting requirements will be defined further including local city permit requirements by the cities of Whittier and Santa Fe Springs and air permit requirements.

Intermediate Design (60%)

Intermediate Design activities will include the preparation of clear and comprehensive design documents, construction plans and specifications, and other design activities needed to implement the work and satisfy all Performance Standards listed in Section 1.2. The Intermediate Design begins with the completion of the Preliminary Design and ends with the completion of approximately 60 percent of the design effort. The Intermediate Design will address EPA comments made on the Preliminary Design submissions.

Pre-Final (95%) and Final Design (100%)

The Pre-Final Design will address all comments made on the Preliminary and Intermediate design submissions and be accompanied by a memorandum indicating how the comments were addressed in the Pre-Final Design. The Pre-Final Design submittal will include an updated capital and O&M cost estimate, reproducible drawings and specifications, and a complete set of construction drawings in full size and one-half reduction. Drawings and specifications must be suitable for procurement and follow the Construction Specifications Institute's MasterFormat 2012.

The Final Design will address any comments, if any, identified on the Pre-Final Design submission and be accompanied by a memorandum indicating how the comments were incorporated into the Final Design. The Final Design will include final versions of all Pre-Final Design deliverables which are certified by a professional engineer registered in the State of California.

3.7.2 Design/Build Approach

In the event that a design/build approach is approved and utilized, the design will be developed to approximately the 60 percent completion level followed by subsequent field engineering during construction, and Pre-Final and Final design activities would not be required. The Preliminary Design in a design/build approach would include a list of the components to be included in the Intermediate Design. Specifications may be integrated into the drawings and other project documents. The Intermediate Design drawings in a

design/build approach will serve as the procurement package drawings to be used for EPA approval, permitting, and construction procurement. Supporting RD deliverables that would have been developed in the Pre-Final Design phase would be developed and submitted as part of the Intermediate Design phase. Record drawings will be produced by the procured RA contractor in lieu of final design drawings.

3.7.3 List of Remedial Design Deliverables

Regardless of the selected design approach used for the RD, the following plans will be developed by the RD contractor and submitted to EPA for approval. As stated in Section 3.7.1, the FSP, QAPP and HASP were developed in support of the PDI activities and are included in the PDIWP.

Site Management Plan

A Site Management Plan will provide an understanding of how access, security, contingency procedures, management responsibilities, decontamination, and waste disposal are to be handled during the RD/RA.

Operations and Maintenance Plan

As a part of the RD, a draft O&M Plan for the final treatment plant will be developed and will include the following, as required per Section 7.7 of the SOW:

1. A description of material and maintenance needs, and anticipated equipment replacement for significant components;
2. A summary of O&M staffing, training and certification requirements;
3. Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, maintenance records, and monitoring reports;
4. A description of routine data collection and analysis activities to be conducted during O&M, including:
    a. Flow rates and volume of groundwater extracted from each extraction well;
    b. Water quality at remedy extraction wells and within the treatment system to monitor operation and determine the need for activated carbon and resin replacement, if applicable;
    c. Water quality measurements from new and existing monitoring wells and/or piezometers within the capture zones of the RDWA extraction wells to provide early warning of conditions that may require changes in remedy operation. The O&M Plan will identify the existing (or new) multi-level monitoring wells (or well clusters) located within the predicted capture zones. The early warning monitoring will include the collection of samples from multiple depths in the contaminated portion of the aquifer;
5. Criteria to determine when activated carbon and resin replacement are needed, if applicable;
6. Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, maintenance records, and monitoring reports;
7. A description of planned routine reporting to EPA and DTSC

8. A description of the plans for the disposal of materials used and wastes generated during O&M (e.g., spent treatment media, wastewater);
9. Provisions for submittal of a FSP, QAPP, and HASP, or addendums to approved plans, to address data collection and analysis related to O&M;
10. Provisions for notification to EPA and DTSC at least 72 hours in advance of any planned shutdowns lasting more than 72 hours; and
11. Description of planned corrective actions in case of systems failure, including:
    a. Alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve the Performance Standards;
    b. Analysis of vulnerability and additional resource requirements should a failure occur; notification and reporting requirements should O&M
    c. Systems fail or be in danger of imminent failure; and
    d. Community notification requirements.

Compliance Monitoring Plan

The CMP describes data collection and analysis activities needed to demonstrate that the RA will satisfy the requirements related to hydraulic control and treatment plant effluent. It will complement the O&M Plan and be supplemented by the Periodic Review Support Plan. A draft CMP will be developed for the RD and finalized during the RA. It will be amended as necessary over the life of the remedy.

The CMP will include:

- The Performance Standards for hydraulic control and treatment plant effluent.
- The types of data to be collected, sampling methods, monitoring locations, and frequency of sampling. Data will include measurement of hydraulic head, water quality sampling of monitoring wells and treated water, and air emission monitoring.
- Discussion of how monitoring and performance data will be analyzed, interpreted, and reported to determine compliance, measure progress, and provide early warning of conditions that may require changes in the operation of the remedy.
- Periodic reporting which discusses remedy performance and compliance status. System operations, extraction rates, and any issues will be noted.
- Procedures for notification of EPA and DTSC of any noncompliance or potential noncompliance of the Performance Standards. Notification must be within one working day of the information.

Construction Quality Assurance/Quality Control Plan

The Construction Quality Assurance Plan (CQAP) will be prepared to describe planned and systemic activities that provide confidence that the RA will satisfy all plans, specification, and related requirements, including quality objectives. The Construction Quality Control Plan (CQCP) will be prepared to describe the activities that verify the RA has satisfied all plans, specifications, and related requirements, including quality objectives. The CQA/QCP will be prepared in accordance with Construction Quality Assurance for Hazardous Waste Land

Disposal Facilities (USEPA, 1986), and Quality Assurance and Quality Control for Waste Contaminated Facilities (EPA/600/R-93/182, 1993). A draft CQA/QCP will begin to be developed during the RD and finalized during the RA. The CQA/QCP will include the following:

- The name, qualifications, duties, responsibilities, and authorities of each person assigned a CQA/QCP function.
- Describe the Performance Standards required to be met to achieve completion of the RA as presented in Section 1.2. of this RDWP.
- Describe the activities to be performed to provide confidence that the Performance Standards will be met and the activities to determine whether the Performance Standards have been met.
- Control, verification, and acceptance procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. If required, approved laboratory facilities must be used.
- Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
- Procedures for tracking construction design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- Reporting procedures, including proposed reporting formats.
- A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications generally may be considered as a definable feature of work, there is frequently more than one definable feature under a particular section.
- Procedures for retention of documents and for final storage of documents

Emergency Response Plan

The ERP will describe procedures to be used in the event of an accident or emergency that occur as part of the implementation of the RD and subsequently during remedial action. In the event of a release of Waste Material (as defined in the 2016 CD) that constitutes an emergency situation or immediate threat to public health or welfare, the ERP will outline provisions on how to respond immediately by taking appropriate action to prevent, abate, or minimize such a release. The EPA Project Coordinator will be notified immediately and take additional actions after consultation with them. In the event they cannot be reached, the EPA Alternative Project Coordinator or the EPA Region 9 Emergency Response Program will be notified.

The ERP must include: 1) the name of the responsible party or parties for responding in the event of an emergency incident; 2) plan and date(s) for meeting(s) with emergency services and local, State, and federal agencies involved in the cleanup; and 3) notification activities in the event of a release of hazardous substance which require reporting under Section 103 of

CERCLA or Section 304 of the Emergency Planning and Community Right-to-Know Act (EPCRA). In addition to the required notification activities under CERCLA and EPCRA, 1) a report will be submitted to EPA within 14 days describing the actions or events that occurred and the measures taken and additional measures to be taken in response to the actions or events; and 2) a report will be submitted to EPA within 30 days after the conclusion of the event describing all actions taken in response.

Institutional Control Implementation and Assurance Plan

The ICIAP describes the plans to implement, maintain, and enforce the ICs discussed in Section 1.4 within the RDWA. The ICIAP will be based on the ICs required by the ROD, and will include:

1. Annual notifications to all water rights holders in the Central Basin and other stakeholders,
2. Periodic meetings with State and local agencies with jurisdiction over well drilling and groundwater use within the Central Basin,
3. An annual review of available documentation maintained by the State and local entities to determine if water supply wells have been installed or a purveyor or other water rights holder had increased groundwater production or production capacity within the RDWA or its vicinity, and
4. Contemporaneous notifications by such agencies regarding groundwater extraction and well drilling.

3.8 Groundwater Monitoring

Groundwater monitoring will be conducted to provide current information on the extent and movement of contaminated groundwater to support the RD and baseline information to be used in future evaluations of RA performance. The SWDs will submit a WAMP for EPA approval.

The WAMP will be prepared by Geosyntec. The WAMP field tasks will be conducted by qualified contractors that will be responsible for implementation in accordance with the WAMP as approved by EPA. Annual groundwater reports will be prepared by Geosyntec in accordance with the WAMP as approved by EPA. Geosyntec will be responsible for preparing the annual reports and may rely on documents prepared by field implementation contractor(s) and/or other qualified contractors.

4. PROJECT ORGANIZATION

4.1 Project Coordinators

The EPA, DTSC, and SWDs will each designate a Project Coordinator who is responsible for overall coordination of work under their respective authority.

4.1.1 EPA

In accordance with the 2016 CD, EPA shall designate and notify the SWDs of its Project Coordinator and Alternate Project Coordinator. EPA may designate other representatives, which may include its employees, contractors and/or consultants, to oversee the Work. EPA's Project Coordinator/Alternate Project Coordinator will have the same authority as a remedial project manager and/or an on-scene coordinator, as described in the National Contingency Plan. This includes the authority to halt or modify the Work, and/or to conduct or direct any necessary response action in response to his or her determination that conditions at the Work Area constitute an emergency or may present an immediate threat to public health or welfare or the environment due to a release or threatened release of Waste Material.

4.1.2 DTSC

In accordance with the 2016 CD, DTSC shall designate and notify EPA and the SWDs of its Project Coordinator and Alternate Project Coordinator. DTSC may designate other representatives, including its employees, contractors and/or consultants to oversee the Work. For any in-person meetings and inspections in which EPA's Project Coordinator participates, DTSC's Project Coordinator also may participate. SWDs shall notify DTSC reasonably in advance of any such in-person meetings or inspections.

4.1.3 SWDs

The SWDs' Project Coordinator is the individual who represents the SWDs and is responsible for the overall coordination of the Work. In accordance with the 2016 CD, this SWD Project Coordinator must have sufficient technical expertise to conduct the Work and may not be an attorney representing any SWDs in this matter and may not act as the Supervising Contractor. SWDs' Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work. It is anticipated that Jack Keener of de maximis, inc. will be the SWD's Project Coordinator.

4.2 Remedial Design Roles

The RD will be prepared by a qualified engineering firm or firms under the direction of the Supervising Contractor (Section 4.2.1). The following remedial design roles and responsibilities will be the same for either the design/bid/build or the design/build approach.

4.2.1 Supervising Contractor

SWDs must designate a Supervising Contractor by the due date of the Preliminary (30%) RD Report, as defined in the SOW.

SWDs' proposed Supervising Contractor must have a quality assurance system that complies with ANSI/ASQC E4-2004, Quality Systems for Environmental Data and Technology

Programs: Requirements with Guidance for Use (American National Standard). The primary role of the Supervising Contractor is to communicate and coordinate with EPA, the OPOG Technical Committee, and the selected design lead regarding site activities and deliverables, provide guidance and perform reviews of project deliverables, and maintain a set of project files.

4.2.2 Design Lead

The Design Lead(s) will be designated by the SWDs at the same time the Supervising Contractor is designated. The Design Lead(s) for respective elements of the NE/CE Area remedy would be responsible for preparing designs and specifications that meet industry standards and the requirements outlined in the SOW.

4.2.3 Engineering Discipline Leads

The Engineering Discipline Leads will be designated by the Design Lead for the respective elements of the NE/CE Area remedy at the same time the Supervising Contractor is designated. The Engineering Discipline Leads will be licensed in the State of California for respective design discipline, report to the respective Design Lead and be responsible for reviewing and approving designs during the RD process.

4.3 Communication and Coordination Activities

Close coordination and frequent communications between project team members is essential to keep the project on track. Specific internal coordination and communication methods that the Design Lead project team will use include:

- Holding a project kick-off meeting with all project staff and OPOG representatives
- Electronic mail (e-mail) communication as required to transmit information, requests for data, and response to questions
- A document control system with regular updates as data and reports are received and available to all through e-mail.
- Immediate documentation and distribution of meeting minutes

4.3.1 Progress Reports

Commencing with the month following entry of the 2016 CD and until EPA approves the RA Completion, SWDs will submit progress reports to EPA on a monthly basis. After a minimum of one year of monthly reporting, SWDs may request, and EPA will consider, a reduction in the reporting frequency.

The progress reports will be prepared in accordance with the requirements outlined in the SOW.

4.4 Remedial Action

The RA is initiated after the EPA has approved the Final RD or if Design/Build approach is selected, after the EPA approves the final revisions to the Intermediate Design. The RA and associated deliverables will be prepared in accordance with the requirements contained in the SOW.

5. SCHEDULE

5.1 Brief Discussion of Pending Consent Decree

The proposed 2016 CD for Omega OU2 was signed by EPA, DTSC and SWDs and filed with the United States District Court, Central District of California, Western Division on April 20, 2016. EPA convened a public meeting regarding the 2016 CD on August 18, 2016. Pending resolution of comments received on the 2016 CD, it will be revised, if necessary, and filed as a final document with the same court. The date of final filing of the 2016 CD will start the deliverable clock**,** as outlined in the schedule of RD deliverables provided below.

5.2 Schedule of RD Deliverables

A project schedule dated April 20, 2016 was developed in accordance with the RD/RA SOW and is presented in Table 6, with milestone durations for RD deliverables. As shown, the durations do not represent time for deliverable review and approval. This preliminary schedule will be updated and additional detail will be provided in the Preliminary Design Report. As needed, further schedule revisions may be included in the Intermediate, Pre-final, and Final Design documents.

6. PERMITTING, PROPERTY ACQUISITION AND ACCESS, THIRD-PARTY AGREEMENTS

This section describes the permitting, property acquisition and access, and third party agreements necessary for implementation of the remedial action.

6.1 Property Access/Acquisition Requirements

Property access to a variety of land use and ownership types, including land owned by SWDs, will be required to complete work in the RDWA. Land use in and around the RDWA include residential, commercial/industrial, and schools, parks, and recreational areas. These land use types are shown on Figure 3. Ownership type include private owners, former and current corporations, and governmental agencies.

If properties in the RDWA are owned or controlled by SWDs, the SWDs will provide access at all reasonable times to the required areas for the RD/RA activities listed in the 2016 CD. If properties are not owned by SWDs, signed access agreements or other legal agreements allowing access for the activities listed in the 2016 CD will be required from all affected owners within areas of work shown in the RDWA before start of the RD/RA. If any of the elements fall within the city right-of-ways or easements, a permit or substantive compliance thereof may be required. The SWDs will not use any property which will pose an unacceptable risk to human health or to the environment due to exposure to Waste Material (as defined in the 2016 CD), or interfere with or adversely affect the implementation, integrity, or protectives of the RA.

SWDs have had preliminary discussions with management at the Water Replenishment District of Southern California (WRD) regarding the potential need for acquisition of water rights and applicable replenishment costs, if any. SWDs will continue that coordination with the Central Basin Watermaster and WRD. Based on the current discussions, no significant issues are anticipated in complying with the judgement “Central and West Basin Water Replenishment District, etc. vs. Charles E. Adams, et al.,” Los Angeles Superior Court Case No. 786656.”

6.2 Substantive Permit Compliance

In accordance with CERCLA Section 121(e), 42 U.S.C. Section 9621(e), CERCLA response actions are exempted by law from the requirement to obtain federal, state, or local permits related to any activities conducted entirely on-site. In this case, “On-site” refers to all facilities up to the point of delivery to the end use, from the extraction wells through the groundwater treatment facility. USEPA OSWER Directive 9355.7-03 clarifies EPA's policy with respect to obtaining permits for activities at a CERCLA site. The substantive requirements of permits, which would otherwise have been required, are met on-site through the USEPA approval process. Therefore, on-site facilities will not require permits, but must comply with ARARs. The ARARs reference specific standards and rules which are essentially permitting requirements for the state and local regulatory/permitting agencies. To the extent that the ARARs reference specific standards and rules of an agency, that agency's rules will be complied with, but without actually applying, paying for, and obtaining a permit. All engineering designs will be submitted to those local agencies with the delegated authority for building and safety codes and standards. The SWDs will coordinate and confer with these

agencies and explain to them at that time that the SWDs is, under CERCLA, not required to obtain permits for on-site actions. It should be noted that by definition local requirements cannot be ARARs.

6.2.1 Design Phase Substantive Permit Requirements

Many of the anticipated reviews by permitting agencies discussed below require that detailed drawings be prepared to accompany the submittal. Only initial consultations can be made with the permitting agency and preliminary permitting procedures determined prior to the start of RD activities. Specific permitting requirements will be established once the details of the project are progressively defined during the design process. Therefore, the following discussion is preliminary and subject to refinement as the design develops. In addition, submittals to permitting agencies (including any permit applications) will state explicitly that a permit or approval for on-site activities is not required, and that the submittals are only for the purpose of coordination and consultation. Furthermore, if participation in such consultations results in delays or attempts to impose inappropriate requirements, USEPA may elect to use its own approval process for the on-site work.

Extraction and Monitoring Well Permits

Installing extraction or monitoring wells in the County of Los Angeles would require meeting the substantive well permitting requirements from the County of Los Angeles Department of Health Services, Bureau of Environmental Protection, Water & Sewage/Mountain & Rural Programs. Upon completion of each new well, a Water Well Driller's Report will be completed by the drilling contractor and filed with the State of California Department of Water Resources (DWR). Wells installed within City rights-of-way would normally require an excavation/encroachment permit, and the installer would be required to acquire worker’s compensation insurance prior to during drilling and installation, and provide a map showing well locations measured from curblines or street centerlines and the location of nearby underground utilities. As described in Section 6.2.2, the SWDs will work closely with LACFD to confirm substantive permitting requirements.

Disposal of Fluids and Soils

The disposal of materials (solid or liquid) generated during construction of the remedy is the responsibility of the SWDs. All waste materials generated from construction of extraction wells and groundwater treatment facilities described in this RDWP will be containerized, properly labeled, and temporarily stored at an appropriate location to be determined within the Work Area. Samples will be collected for waste profiling and sent to a California-certified laboratory for analysis in accordance with California Code of Regulations, Title 22, Section 66261.24. Following waste profiling, the waste material will be transported by a licensed waste hauler for disposal at an appropriately permitted solid or hazardous waste facility in accordance with Federal and State requirements. Construction waste will be stored for no more than 60 days during characterization and consolidation. Handling of investigation derived waste is described in Section 6 of the FSP.

Cities of Whittier and Santa Fe Springs

The extraction well fields, associated pipeline, the groundwater treatment facility, pumping facilities and pipeline will be located in the Cities of Whittier and Santa Fe Springs. Typical permitting requirements for these two municipalities are as follows:

- Encroachment and building permits for use of and construction in City rights-of-way.
- Excavation permits for construction in City rights-of-way.
- Plan checks and building permit for the groundwater treatment facility. Additional construction permits e.g. traffic control permits may be required after completion of the RD and will be specified in the RA workplan.

The Zoning Code in these municipalities regulates the size and height of buildings, as well as specific types of uses permitted in the various zoning districts within the Cities. The Zoning Code also establishes the procedures for development approvals. As described in Section 6.2.2, SWDs will work closely with the applicable City agencies to ensure conformance with the Zoning Codes.

Railroad Rights-of-Way and Access

Project pipelines may cross railroad rights-of-way. Boring and jacking of pipelines under railroad tracks may be required. A railroad encroachment permit is normally required. The permit contains design and construction guidelines.

Los Angeles County Department of Public Works Flood Control Division (LACFCD)

A permit would normally be required to discharge to a storm drain or to build over an existing storm drain or within a flood control easement. A permit application must be submitted to the main permit office of the LACFCD with four sets of plans and two sets of structural calculations demonstrating that the proposed improvements would not detrimentally affect the storm drain system nor its maintenance. The permit application and Guidelines for Overbuilding and Air Rights are available through the internet.

Los Angeles County Department of Public Works (LACDPW)

Three types of permits would normally be required by LACDPW for any work within the road right-of-way to ensure that construction plans comply with the Public Works Standard Specifications and other provisions of the County Codes. LACPDW issues these permits for work in any of the unincorporated portions of Los Angeles County. Both the cities of Whittier and Santa Fe Springs have their own public works departments that issue construction permits within city limits. Construction permits are necessary for the construction or reconstruction of driveways, curb drains, sidewalks, curbs and gutters, and other types of surface construction.

Excavation Permits are necessary when any portion of the road right-of-way, from property line to property line, is cut for the purpose of laying down utility lines, installing electrical cabinets, installing poles or constructing manholes.

An encroachment permit is necessary if any part of the road right-of-way (from property line to property line) is used for storing materials, detouring traffic or parking equipment in the street overnight. Encroachment permits are issued for temporary and long term placements.

As described in Section 6.2.2, the SWDs will coordinate substantive permitting requirements with LACDPW.

Los Angeles County Fire Department (LACFD), Fire Prevention Division

A fire access permit would normally be required from LACFD. This requires submittal of construction plans for plan check, prior to or concurrently with the submittals to LACDPW. A LACFD form describing the fire flow availability should also be completed for a Building Permit if required.

All development constructed within the jurisdiction of the LACFD shall comply with Sections 902 and 901.3 (fire apparatus access roads; timing of installation of fire protection facilities, respectively) of the Los Angeles County Fire Code. All-weather fire access roads shall be installed and made serviceable prior to and during the time of construction. Permissible fire access road construction may include, but not be limited to, the following:

a. Three inch (3”) Type II A.C. pavement on four inch (4”) crushed aggregate base.
b. Six inch (6”) Type II A.C. pavement on native soil.
c. Six inch (6”) Portland cement concrete pavement on native soil.
d. Four inch (4”) crushed aggregate base (sand, gravel mix compacted to 95 percent or greater) with the first layer of asphalt.

California Regional Water Quality Control Board Los Angeles Region (RWQCB-LA)

The RWQCB-LA is responsible for the issuance of waste discharge permits and the Water Quality Control Plan for the Los Angeles region. All storm water discharges from the site during construction will meet the substantive requirements of the RWQCB-LA’s Storm Water Program Order 2009-0009-DWQ which includes development of a storm water pollution prevention plan (SWPPP).

All non-storm discharges other than exempted temporary discharges must meet the substantive requirements of the General NPDES Permit No. CAG994004 (Order No. R4-2013-0095) for discharges of treated groundwater from investigation and/or cleanup of VOC contaminated-sites to surface waters in coastal watersheds of Los Angeles and Ventura counties (herein referred to as VOC General Permit). Covered discharges include cleanup and/or construction dewatering activities.

State Water Resources Control Board (SWRCB)

The SWRCB is responsible for waste discharge into sanitary sewer systems. Discharge of the brine generated from either NF or RO treatment would need to meet the substantive requirements of Order No 20006-003-DWQ.

6.2.2 Approach to Meeting Substantive Permit Requirements

The plan and schedule to obtain, or substantially comply with, permits can only be generally stated at this time, because the specific processes and facilities are not yet known. When the facilities' type, size, location, etc. are determined during the conceptual design, substantive permitting requirements can be more fully defined. The anticipated approach is as follows:

1. Confirm with EPA, and applicable municipalities or other government entities, as appropriate, on an action-specific basis and as necessary, the permits that must actually be obtained for "off-site" facilities and those permits not actually required under CERCLA for facilities and activities entirely "on-site".
2. Make preliminary contacts at potential permitting agencies to obtain initial requirements, forms, and estimated times and costs to obtain permits for off-site facilities, and to discuss substantive requirements for on-site facilities. Initial contacts will be to the following agencies for identification of substantive permit requirements:
    - City Planning and Engineering Departments for Whittier and Santa Fe Springs and other cities that may be impacted by pipeline routing
    - Los Angeles County Department of Public Works
    - City of Whittier Department of Public Works
    - City of Santa Fe Springs Department of Public Works
    - Log Angeles County Fire Department
    - Los Angeles Regional Water Quality Control Board
    - Central Water Basin Watermaster
    - South Coast Air Quality Management District (SCAQMD) (only if VOC treatment determined during the RD includes air stripping or other applicable processes [e.g. tanks)
3. For facilities in public rights-of-way, hold a meeting with the permitting agency after preliminary plans are completed to obtain approval of facility locations. Make similar contacts with the railroad and other private entities for access or easement agreements.
4. Prepare a schedule of required permits based on the estimated normal time frame for review/issuance of the permit for off-site facilities. Determine most critical permits and impact on design or remedial action schedule.
5. Provide regular follow-up during the permit review period and provide quick responses for additional information.

The status of substantive permitting activities will be reported to EPA in the monthly progress reports required under Section 6.1 of the SOW.

7. REFERENCES

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